Wastewater Treatment Division

Maintenance Section

King County
Department of Natural Resources

The WTD Maintenance Section...

Implementing efficient wastewater treatment solutions to preserve quality of life in our region

The West Point Treatment Plant, located on Puget Sound, serves an area of approximately 169 square miles. The secondary treatment plant treats an average of 110 million gallons of wastewater per day.

The System

In the Seattle area today, 1.2 million citizens will step into their showers, throw a load in the washing machine, start the dishwasher, and flush their toilets, sending millions of gallons of water into the sewers. And each day, hundreds of companies and industries will also pump millions of gallons of water into the sewers.

Every 24 hours, over 200 million gallons of wastewater flow through 255 miles of sewer lines to two regional treatment plants for secondary treatment. At 39 pump stations, large pumps automatically start and stop to control the flow. Gates at 22 regulator stations automatically direct and control the flow.

The East Section Reclamation Plant serves 600,000 customers in the suburban Seattle area. The secondary treatment plant treats an average of 103 million gallons of wastewater per day.

The Maintenance Section

Who assures that these essential wastewater treatment processes and systems operate at top efficiency to protect and preserve the quality of life King County citizens expect and deserve?

The King County, Department of Natural Resources Wastewater Treatment Division (WTD) maintenance section is responsible for keeping this system of sewage conveyance and treatment operating efficiently and smoothly 24 hours a day, preserving water quality and protecting public health and the environment.

The 122 highly-trained, professional **WTD maintenance section** personnel use leading-edge technology and equipment to service and maintain this intricate system.

Section Accomplishments:

- 1.2 million citizens served
- 200 million gallons wastewater treated every 24 hrs
- 16,500 work orders completed annually
- 10,000 pieces of equipment maintained annually

Complex Systems Wastewater Treatment

At WTD's two advanced treatment plants, complex systems perform at the highest industry standards. They pump, filter, spin, aerate, drain, siphon, force, filtrate, separate, ventilate, oxygenate, circulate, cool, heat, and chlorinate the wastewater as it flows through the preliminary, primary, and secondary treatment processes.

In addition to maintaining the essential wastewater treatment equipment and systems, complex support systems require continual maintenance, monitoring, servicing, replacing, lubricating, and calibrating. These systems include:

- Electrical systems
- Water systems
- Compressed air systems
- Heat loop systems
- Odor control systems
- Heating, ventilating, and air conditioning
- Computerized alarm and control systems

Thousands of pieces of equipment must be checked, serviced and repaired annually.

Three Maintenance Programs

Three maintenance programs enable the maintenance section to service and repair equipment and systems daily and also to respond to emergency equipment breakdowns and system failures, as shown below.

WTD Maintenance Program

Scheduled Maintenance

Scheduled maintenance is the day-to-day service and repair of equipment and systems due to normal wear and failure.

Scheduled maintenance keeps 64 facilities in top operating condition, and maintains flow to the plants, and prevents overflows to private and public property.

Preventive Maintenance

Preventive maintenance (PM) reduces maintenance costs and equipment downtime, and eliminates catastrophic failures of equipment.

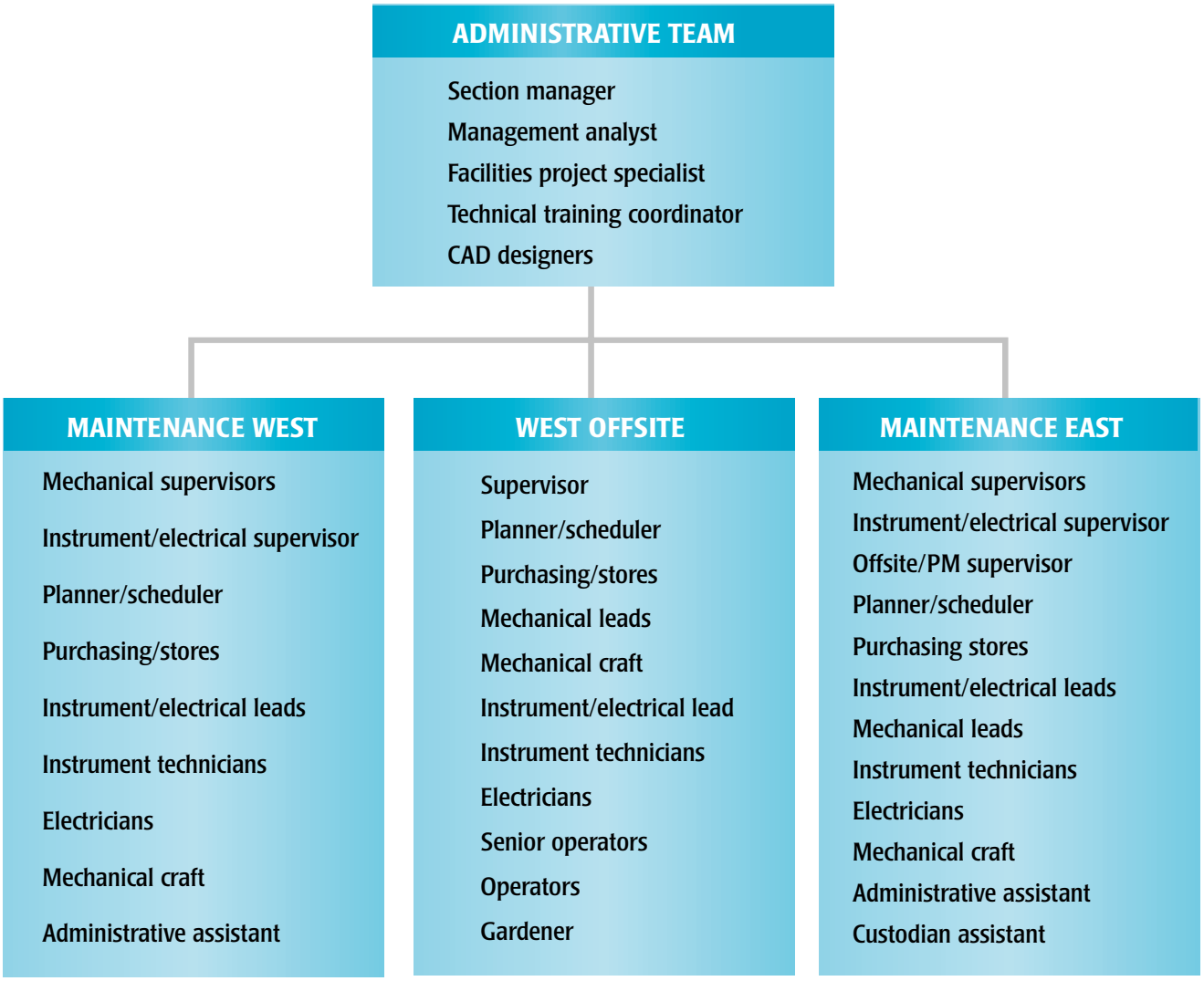
In the PM program, all major equipment at the plant and at all offsite facilities is on a regular maintenance schedule. With regularly scheduled checking and servicing, many hours and dollars are saved by detecting potential problems before equipment breaks down.

Emergency Maintenance

Emergency maintenance is required when unplanned equipment failures occur demanding immediate attention. Flexibility is vital because the maintenance teams must respond to emergency repairs while continuing scheduled and preventive maintenance work.

Maintenance is well prepared for any emergency. All major equipment, and most other equipment, are backed up by at least one standby unit. This redundancy system, together with a well-maintained equipment inventory, provide quick, essential equipment repair and replacement during an emergency.

WTD Maintenance Staff Organization



WTD maintenance section is managed by the section manager. An administrative team assists the manager in the daily operation and planning for the west, east, and offsite teams.

The administrative team works closely with the east and west operations teams in managing WTD's two advanced treatment plants and offsite facilities.

The Maintenance Administrative Team

About the Team

The maintenance administrative team includes the section manager, the management analyst, facilities project specialist, technical training coordinator and CAD designers. They manage the three maintenance section teams from two locations: the West Point Treatment Plant maintenance building and the East Section Reclamation Plant maintenance building.

Section Manager

The section manager is responsible for the **long-range planning** and the **day-to-day operation** of the maintenance section.

The manager regularly meets informally with the mechanical and instrument/electrical leads and supervisors to discuss day-to-day operating problems and decisions The manager also formally meets monthly with the entire maintenance management team—supervisors, planners/schedulers, trainers, administrative project staff, and designers to discuss current maintenance policies, projects, and problems.

The manager attends bi-weekly WTD **management team meetings** and reports on the major maintenance section projects. The manager keeps the maintenance sections up to date on the status of major department decisions that impact them.

Budget/Finance

The management analyst **prepares and tracks the section** $11,500,000 annual budget. Major budget items are salaries and supplies. The analyst submits monthly budget updates to the section management team and revisions to the spending plans are made as needed. Careful monitoring throughout the year results in the maintenance section meeting their budget projections within two to three percent each year.

The maintenance section capital program consists of new equipment purchases, equipment replacement plans, and new projects. When considering major equipment replacement, the analyst submits the section capital program requirements and prepares cost-benefit analyses for review by section management.

The management analyst provides analytical support to the WTD **Gainsharing Program**.

Most recently, the analyst is representing maintenance in the multi-agency **Benchmarking Project**, where representatives from other wastewater treatment facilities compare operating costs and operations and maintenance methodologies.

Facilities Projects

The facilities project specialist assures the efficiency of long-range maintenance planning efforts through coordination with other related programs within WTD.

The facilities projects specialist represents the maintenance section in the **planning, design and construction** of major capital projects. All equipment specifications under consideration for installation in WTD facilities are reviewed from a maintenance perspective.

Section manager checks progress on equipment repair.

Recent major facilities projects include the West Point Treatment Plant expansion to secondary treatment and the Renton III Expansion.

Design/As-Builts

The main responsibility of the maintenance design/as-built team is keeping over **11,000 west section drawings monitored, current, and available** for maintenance crews and other site personnel. The team tracks changes made to West Point and offsite equipment and systems, and then revises and distributes the updated drawings.

An important part of the job is assisting engineers, maintenance crews, and consultants **research, locate, and acquire accurate data** for their projects.

A workstation located in the instrument shop, with read-only access to the drawing database, allows personnel to research drawings, monitor job progress, plot, or make red-line sketches.

CAD (computer-aided design) workstations, the CAD server, plotters, and hard copies of **all West Point drawings** (current and historical), and other reference materials are located in the design/as-built offices on the second floor of the maintenance building.

CAD operators discussing updates to computerized construction drawings. Maintenance personnel can access these drawings also from a separate workstation.

Training

New equipment and technologies, safety awareness, technical knowledge, job progression, and skill improvement require a comprehensive training program for all maintenance personnel. The maintenance training coordinator is responsible for the training programs in the section.

Safety training is a top priority and regularly scheduled safety training ensures that all maintenance personnel are trained and certified for first aid and hazardous situations.

"**Train the Trainer**" classes were developed by the training coordinator to provide in-house training by maintenance craftspersons rather than hiring outside trainers. This capability saves training dollars and enhances job satisfaction.

Another major part of the maintenance training program is the **Job Progression Program**. Job progression, developed jointly by management and personnel, allows personnel to advance based on their contribution to the business and to have more control over their career growth. Job progression has resulted in a more productive, higher quality work environment with increased efficiency and effectiveness in plant operations and maintenance.

The maintenance training coordinator works with each business team to develop consistent job progression standards and tasks lists. He also verifies training accomplishments, administers tests, and advises management on job progression procedures. Of the 122 employees assigned to maintenance, 41 are or were eligible to participate in job progression—the others are either exempt or beyond their last gate. To date, 13 of those eligible have completed the requirements to pass through a gate and have been promoted to the next level; this is a 30 percent success rate.

Planning/Scheduling

The planner/schedulers are the hub of the maintenance program. They coordinate and facilitate maintenance projects at the treatment plants and the offsite facilities.

Planning the Days and Weeks

Schedules are planned weekly with enough flexibility to accommodate unexpected equipment problems or necessary process changes.

The planner/schedulers meet daily with operations personnel, maintenance supervisors, and craft leads to identify, prioritize, and plan work for the day. High priority work requests are integrated into the existing weekly schedule of planned work and preventive maintenance. This monitoring and communication assists in keeping critical equipment in service.

Coordinating with Operations and Process Control

Any impacts on plant operations are coordinated with operations and process control personnel. Major projects that require equipment be taken out of service are frequently scheduled during the dry summer months, when flows into the plants are at their lowest.

Purchasing/Stores

Parts, materials, and service contracts are a major part of planning for the maintenance section. Each maintenance facility has a warehouse staffed by purchasing/stores personnel responsible for **ordering, receiving, and disbursing parts** for work orders. They maintain an inventory of critical spare parts. Maintenance materials and supplies are purchased on an as-needed basis and service contracts are created for specialized work to be performed.

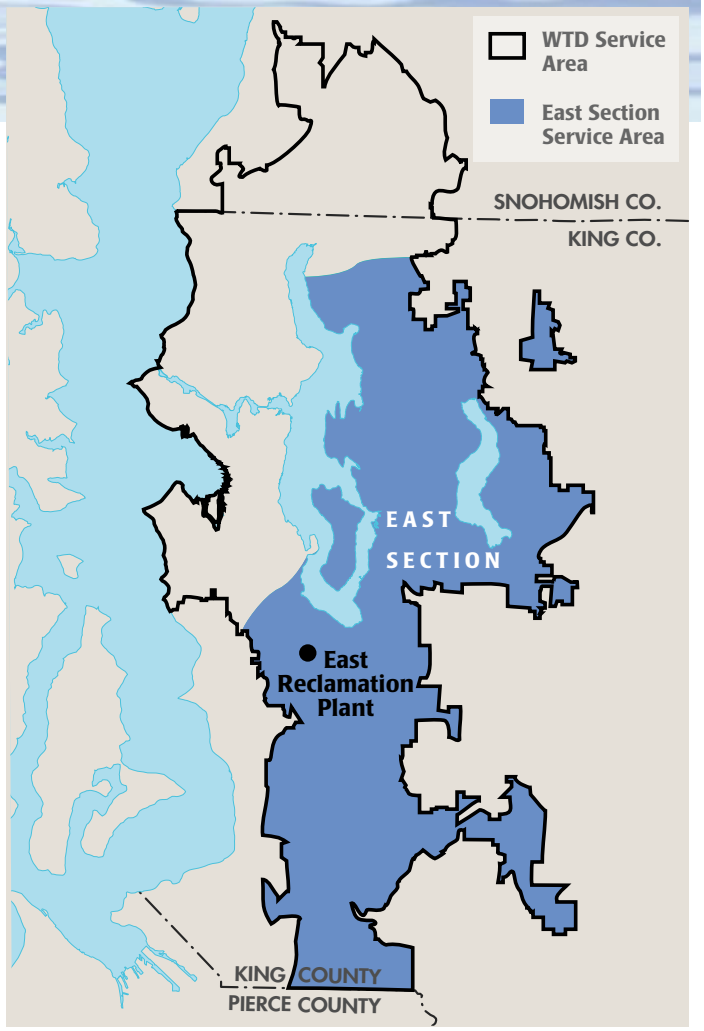
The combined inventory value at the three facilities exceeds $5 million dollars with over 6,000 inventory items on hand.

Planning and purchasing staff assess the availability of repair parts locally, the demand for routine parts and materials, and the lead time required to receive parts from vendors out of the area to determine which parts and materials need to be stored onsite in our warehouses. Minimum and maximum stocking levels are determined and a computer report is generated to "flag" parts that need restocking.

East Maintenance Teams

About the Teams

East maintenance supports the East Section Reclamation Plant and east offsite facilities. East maintenance includes the instrument control and electrical (ICE) team and the mechanical team.



East ICE Team

The ICE team includes the instrument/electrical leads, instrument technicians, and electricians that service the East Section Reclamation Plant and east offsite facilities.

Typical ICE Projects

- Replaced main and drive boards in variable speed drive.
- Replaced faulty power supply for the programmable logic controller (PLC) and reprogrammed the PLC at the Murray Pump Station (PS).
- Corrected problem at Murray PS PLC. The station lost communication with Renton, causing pumps to perform in fill-and-draw mode. Electricians replaced a defective PLC.
- Completed upgrade of station controls at Bellevue PS. Cleaned up wiring and completed as-builts.
- Completed an installation of the communication intertie between the water reuse system and Forney.
- Programmed the pump building programmable logic controller for a new raw sewage pump RSP 5.
- Installed drywell flood alarm floats in lower level of all five flow control structures.
- Replaced wet well level recorder at Bellevue PS.

The East ICE Team:

"Our mission is to provide the most efficient and complete electrical and instrumentation control systems possible for the east operations section of WTD."

East Mechanical Team:
"Our mission is to provide quality mechanical repair in a timely, cost-effective, and safe manner in support of our customers."

East Mechanical Team

The east mechanical team includes the lead mechanics, master mechanics, mechanics, lubrication specialists, PM mechanic, vibration analyst mechanic, offsite team, and maintenance worker.

Typical Offsite Mechanical Team Projects

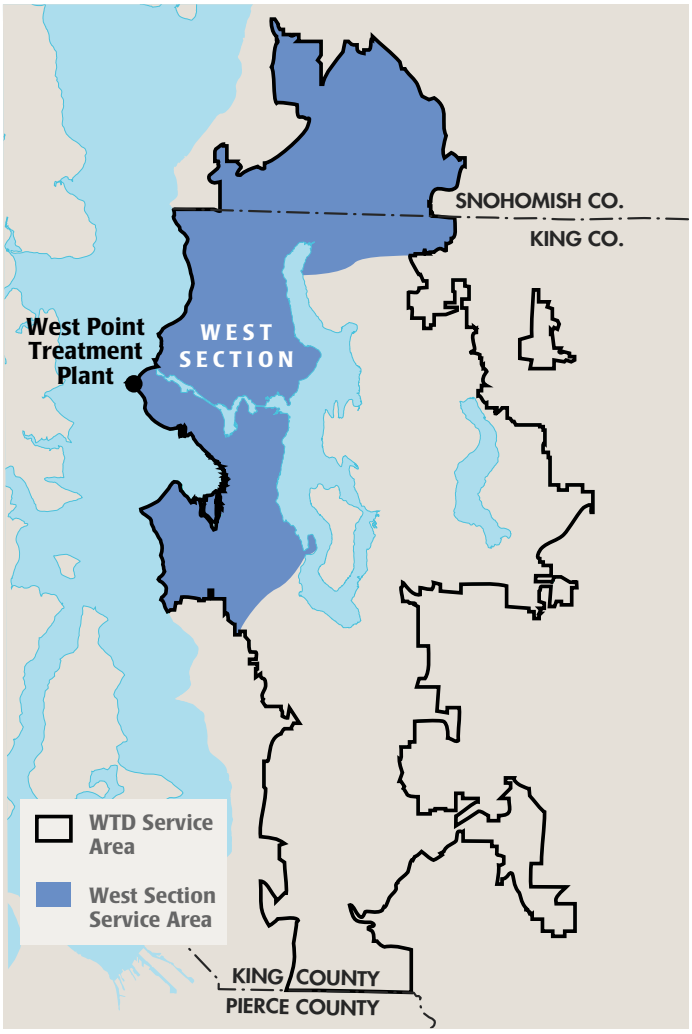
- Rebuilt and installed RSP 2 at Heathfield PS.
- Replaced the RSP 4 at Murray PS with a rebuilt pump from inventory. Rebuilt the removed pump, replacing the wear sleeve, bearings, and seals.
- Repaired leak on 16-inch force main at Wilburton PS.
- Pre-fabricated a spool piece of pipe with flanges and a saddle, cut out worn section of pipe, welded new section in place. No interruption of service at the pump station.
- Repaired RSP 2 at South Mercer Island PS. Replaced impeller.
- Removed drive line from RSP 2 at Juanita Bay PS to replace u-joints and have it balanced.

Typical Mechanical Team Projects

- Rebuilt DAFT 1 and 2, involved fabrication and assembly work.
- Completed modifications to motor base of gas scrubbing compressor 1. Eliminated vibration problems.
- Rebuilt instrument air compressor 3.
- Replaced DAFT 6 THS pump.
- Overhauled belt filter 8 press washwater pump.
- Completed major overhaul to belt filter press 1 in dewatering.
- Overhauled instrument air compressor 3.

An east mechanical vibration analyst mechanic checks equipment for worn parts.

West Maintenance Teams



West maintenance supports West Point Treatment Plant. West maintenance includes the power and control (PAC) team and the west mechanical team.

West Mechanical Team

The west mechanical team includes lead mechanics, master mechanics, engine mechanics, mechanics, lube specialist, and maintenance worker.

Typical Engine Mechanic Projects

- Replaced turbochargers for co-generator engine 2.
- Rebuilt co-generator radiator cooling tower.
- Rebuilt engine for co-generator 1.
- Rebuilt instrument air compressor 2.
- Installed new manifold on co-generation engine 3.

Typical West Mechanical Projects

- Rebuilt west grit pump 4.
- Rebuilt east raw sludge pump 6.
- Rebuilt digester feed pump 2.
- Rebuilt digester 5 gas mixing compressor 1.
- Installed isolation valves at the pressure relief valves and rebuilt relief valves for digesters 1,2,3 to reduce odor.
- Rebuilt centrifuge 1 discharge conveyor by replacing its screw.
- Inspected and made repairs to east primary sedimentation tank 1.

West Mechanical Team:
"Our mission is to consistently provide the highest quality of mechanical maintenance, repairs, and installation services that will enable all personnel to operate equipment and facilities efficiently, safely, and with reliability."

West PAC Team:
"Our mission is to provide high quality, cost effective, technical expertise for the maintenance, modification, and design of the West Point Wastewater Treatment Plant's power distribution and control systems."

West PAC Team

The power and control (PAC) team includes instrument/electrical lead, the electricians, and instrument technicians.

Typical PAC Team Projects

- Repaired VSD for effluent pump 3.
- Modified co-generator radiator controls.
- Repaired and maintained primary and combined sewer overflow (CSO) hydraulic systems.
- Rebuilt post-chlorinators 3 and 4.
- Completed repairs to chlorinators:
    - repaired valves
    - rebuilt regulators
    - checked valves
    - calibrated electronics
- Recalibrated prechlorinator to meet treatment process demands.
- Repaired final effluent flowmeter.
- Identified and implemented short term and long term solutions for plant hydraulic system.

PAC team electrician cuts threads in west maintenance shop.

West Offsite Team

West Offsite Maintenance Team

The west offsite team operates and maintains the west section pump stations, regulators, and collection system for West Point Treatment Plant (WPTP).

West Offsite Team:

"Our mission is to operate and maintain the offsite facilities efficiently and effectively."

Pump stations (such as Interbay shown above and right) are main worksites for the offsite team. Their job is to keep wastewater smoothly flowing to the WPTP.

Offsite Location

The offsite team combines operations and maintenance into one team with a common goal. This combined maintenance and operations team was created in 1992 to meet a permit requirement to reduce total traffic into WPTP.

The offsite team is located at the Jameson Building, about five minutes from the WPTP. The building contains a fully-equipped machine shop, electrical/instrumentation repair shops, offices, and a large meeting/ conference room.

Daily Pump Runs

The offsite operations team, senior operators and operators, visit offsite facilities daily to service all equipment, alarms, controls and to perform daily, weekly, and monthly tests at each facility to assure the integrity of the operating, alarm, and warning systems.

Emergency Response

Offsite personnel rotate weekend standby duty to be available 24 hours a day to respond immediately to equipment failure at any offsite facility.

Typical Offsite Projects

Instrument/Electrical Team

- Repaired wet well float switch and reinstalled high wet well floats at Lake Ballinger PS to improve backup control.
- Moved pump 2 controls at Interbay PS to improve running the generator on simulated outage.
- Assist with installation of VSDs at several offsite stations.
- Installed new rain gauges at several pump stations.
- Completed the yearly PLC battery change-out PM.
- Programmed and installed new Metrotel II system.
- Changed UPS batteries in all west facilities.
- Installed new chlorine analyzer and sampling system at Carkeek CSO plant.

Mechanical Team

- Replaced several instrument air compressors at several pump stations.
- Rebuilt pump 5 unit at Richmond Beach PS.
- Replaced hydraulic oil pump 2 at Matthews PS.
- Replaced anti-reversing gear on pump 3 at Duwamish PS.
- Overhauled pump 2 at Belvoir PS.
- Inspected and installed silencers on Densmore force main pressure relief valves.
- Rebuilt Carkeek grinder.
- Assisted with University odor control project and Hidden Lake discharge pipe replacement projects.

Operations Team

- Started the flow swap with Edmonds Treatment Plant at Lake Ballinger PS.
- Changed carbon in Lake City odor control unit.
- Did a storage program to assist in shut down of the WPTP plant (planned shutdown of pump and regulator stations to store sewage in wet wells and trunk lines).
- Worked on startup of the new West Seattle PS.
- Changed out carbon in Denny odor control unit.
- Assisted with testing of new Harbor regulator gate.
- Assisted with Hidden Lake PS discharge pipe replacement project.
- Assisted with installation of temporary odor control unit at University Regulator.

Offsite staff are the maintenance staff's "road crew," travelling to the sites they maintain. The offsite team attracts self–starters who don't mind working alone or the occasional encounter with a snake.

WTD Maintenance Today

Maintenance personnel use state-of-the-art lasers to check machinery alignment. The maintenance section always strives to prevent problems from occurring to avoid system downtime.

Maintenance Faces New Challenges

With major expansion projects at both treatment plants and new, more complex pump stations and collection system components coming online, the maintenance section has a challenge to maintain equipment and processes at top performance level.

Preventive and Predictive Maintenance

Preventive and predictive maintenance are the backbones of the equipment maintenance program. Ranging from weekly to biannual schedules, equipment is checked, serviced, and maintained to protect both the initial capital investment and minimize corrective maintenance downtime.

Maintenance Section Vision:

"Working together to create an environment where people can achieve goals and meet the challenges of the future through safety, integrity, teamwork, respect, trust, diversity, communication, honesty, positive attitude, and technical competence."

"We are dedicated to provide quality maintenance services and support to all of our customers."

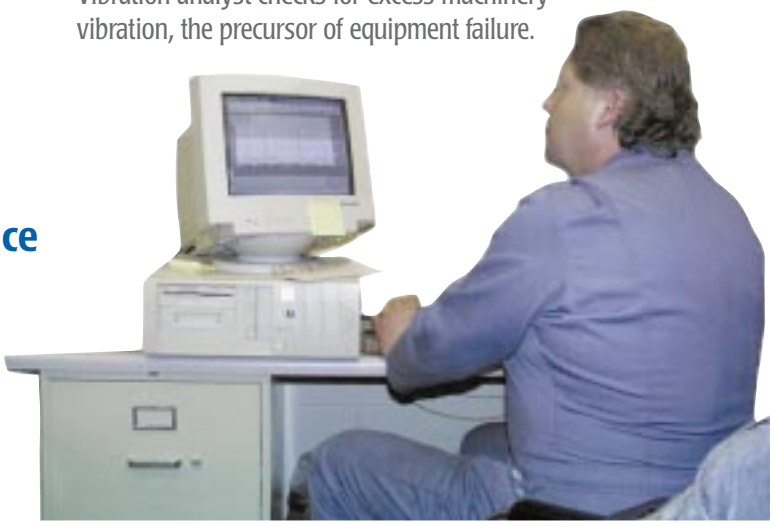
Lubrication, vibration analysis, and laser alignment are components of the predictive maintenance program. Detailed step-by-step procedures and indicators are identified by the preventive maintenance program.

Equipment Vibration Analysis

The vibration analysis program detects conditions in the machinery, such as alignment and impeller wear, that cause premature failure.

Using special equipment and training, the vibration analyst determines the "root causes" of rotating machinery problems, such as imbalance, misalignment, vane-pass, or drive problems. The ability to discover problems before they cause costly equipment failures results in both reduced labor and parts costs.

Vibration analyst checks for excess machinery vibration, the precursor of equipment failure.



Laser Alignment

Manufacturing industry statistics show that 50 percent of rotating equipment failures are caused by poor or improper alignment techniques. Laser alignment technology checks and corrects internal conditions such machinery misalignment. Maintenance teams employ the very latest in laser alignment techniques.

All major capital equipment and most other equipment is now aligned using laser techniques. Laser alignment of new construction equipment begins a valuable historical tracking record.

Lubrication and Oil Analysis

The lubrication oil analysis program identifies and diagnoses internal conditions that contribute to machinery internal surface and component wear and destruction. The program includes three types of analyses:

Fluid properties analysis identifies physical and chemical properties of the lubricating or power transfer fluids of machinery. Tracking these properties allows for early detention of oil breakdown, which causes equipment wear.

Fluid contamination analysis identifies what contaminants are present and at what concentration. Contamination is the leading cause of failures and rapid wear in process machinery.

Wear debris analysis identifies the presence of machine wear particles. Analysis of the size, shape, color, and texture of particles helps determine the origin.

Cost Savings Through New Technologies

The combination of these three technologies enables maintenance to improve the quality of mechanical maintenance, as follows:

- Reduce labor costs
- Reduce parts costs
- Improve planning/scheduling
- Improve budget planning for large work requirements

Rebuilding pumps often requires machine work. Providing this work in-house eliminates the need to send equipment out for repair, saving time and money.

- Maintain precise, historical records of equipment operation/maintenance
- Increase machine time, decrease downtime

These cost savings are reflected in the WTD Gainsharing Program each year.

In-House Machine Shop Benefits

The west offsite machine shop provides in-house expertise and fast service at a cost savings of thousands of dollars by manufacturing standard and customized tools and parts for all wastewater facilities.

Cost and Time Savings

The machinist fabricates tools and parts that are no longer available from the manufacturers. With the in-house ability, maintenance saves money by not having to purchase new equipment to replace obsolete pieces.

Typical Machine Shop Projects

- Manufactured sprockets and saved $1,120.
- Custom-designed samplers for solids.
- Machined a new shaft for emergency repair for the Interbay PS, for a savings of $4,215 and two weeks in delivery time.

Inventory Parts

Another important part of the machinist's work is the manufacture of parts for the maintenance inventory such as shafts, seals, wear sleeves, and many other parts. Producing these parts in-house saves approximately 20 percent over the outside price.

In-House Shop Drawings Benefits

The machinist also produces the shop drawings for specific pieces of equipment. The drawings are cataloged and filed for future use. This saves maintenance time and money because shop drawings were previously sent outside.

Performance Standard Sample

1 Form # PM#:WM-707A-EPS3 ANNUAL

2 Equipment to be repaired
EPS pumps coupling insp. 707-P09AC031

3 Persons Required: 2

4 Estimated Hours: 5

5 Job Description:
Annual coupling inspection—EPS goulds pump 3 [holset coupling]

6 Work Requested:
Inspect rubber blocks in holset coupling on pump 3

7 Tools and Parts Needed:

1. 32—Rubber blocks DCB 847.5—#U10097
2. Metric all-thread 2.0 x 2.5
3. 1-3/16 Socket and ratchet
4. Torque wrench set for 243 foot pounds

8 Lockout Location and Safety Warnings:

1. Electrician is required to perform lockout [2 locks].
2. Valve out discharge side hand wheel [1 lock].
3. Close and lockout influent gate in parking lot [1 lock].
4. Close and lockout hydraulic valve on discharge side of pump.

9 Procedure List:

1. Pull off two opposite sides of guards to access coupling.
2. Take out two bolts from one side of bottom plate and insert metric all-thread rod into bolt holes, run nuts up all-thread to hold plate in place. Remove rest of bolts and lower bottom plate down the all-thread.
3. Visually examine the rubber blocks to check for any of the following:
   A. Large amounts of dry rubber dust or loose fitting rubber blocks. This shows that the rubber blocks are abrading and should be replaced at the next scheduled shut down.
   B. Deep cuts or deformed rubber blocks show that the coupling has been overloaded. They should be replaced at the next scheduled shut down.
   C. Rubber blocks should have a slight oil film coating them.
   D. After inspection—note that the nuts may be only used three times.

The sample performance standard above informs the maintenance craftsperson assigned to this project that this is an annual preventive maintenance project performed on effluent pump 3 impeller. Two persons will be required and the inspection should take about five hours to complete. Several tools and safety equipment will be needed. A confined space permit is required before work can begin. Lockout/tagout locations are provided.

Performance Standards

Performance standards are the standard operating procedures for the preventive maintenance (PM) projects. They provide all the details of a specific PM project, including time and number of persons required. This information helps both the planner/schedulers and the craftspersons.

The performance standards were developed by the craftspersons in the field. They recorded each step and detail of a project as it was performed.

Computerized Maintenance Program

The maintenance section has used a computerized maintenance information system for 14 years. This year, a new system was installed, MainSaver— a Windows-based computerized maintenance management software program. MainSaver allows maintenance to collect the standard information used in the past—work and equipment history, timekeeping, and equipment parts listings. The program can also use the information as a management tool to track labor and materials expended, analyze program efficiency, identify capital replacement before breakdown, monitor workload, detect trends, and identify needed resources.

With the new MainSaver system, maintenance can quickly and efficiently schedule projects with instant access to equipment history, present inventories, current workload, and available personnel.

Work Orders/Work Requests

MainSaver processes work requests and generates a work order that coordinates the work of the purchasing/stores teams and the teams in the field. It efficiently tracks all equipment work history and prints out parts lists, standardized procedures, and equipment drawings.

With MainSaver, the maintenance section can quickly assess the best progress for a specific system or piece of equipment based on history, present inventory, current workload, and available personnel.

Preventive Maintenance

MainSaver generates PM work orders according to equipment hours and schedule dates. The PM program also prints out the standard performance procedures, a scanned drawing, or as-builts along with the work order.

Lubrication Program

MainSaver allows the lubrication specialists to create "lube routes," which identify grease points, high/low values, lube oil codes, parameters, and sampling locations.

Time Keeping

Maintenance created a customized time keeping module to effectively meet their specific employee needs. An employee is automatically upgraded when working outside their primary job description. Payroll records are entered into MainSaver.

Historical Records

MainSaver is a great long range planning tool for the maintenance teams. MainSaver's historical equipment records includes: purchase date, price, manufacturer, number of repairs, cost of repairs, length of service, and cost of replacement. With this information, maintenance determines when to repair or replace failed equipment.

Both east and west treatment plants are amazingly efficient and clean. Staff work closely with the community to be a good neighbor monitoring odors and making sure excellent service is provided 24 hours a day, every day of the year.

Revenue-Producing Maintenance Projects

West Point Treatment Plant
Co-Generation System

West Point co-generator undergoing routine maintenance.

The co-generation system at West Point Treatment Plant uses methane gas from the digesters to fuel engine generators and boilers to produce electricity and heat. **The co-generation system produces an annual revenue in excess of $350,000 in sales of electricity to Seattle City Light.** The hot water generated by the engines and heat recovery boilers provide heat to the entire plant.

The co-generation system consists of three 1,300 kW co-generation units. Each unit consists of an engine generator and heat recovery boilers. Auxiliary equipment includes turbochargers, gas compressors, heat exchangers, cooling pumps, and expansion tanks.

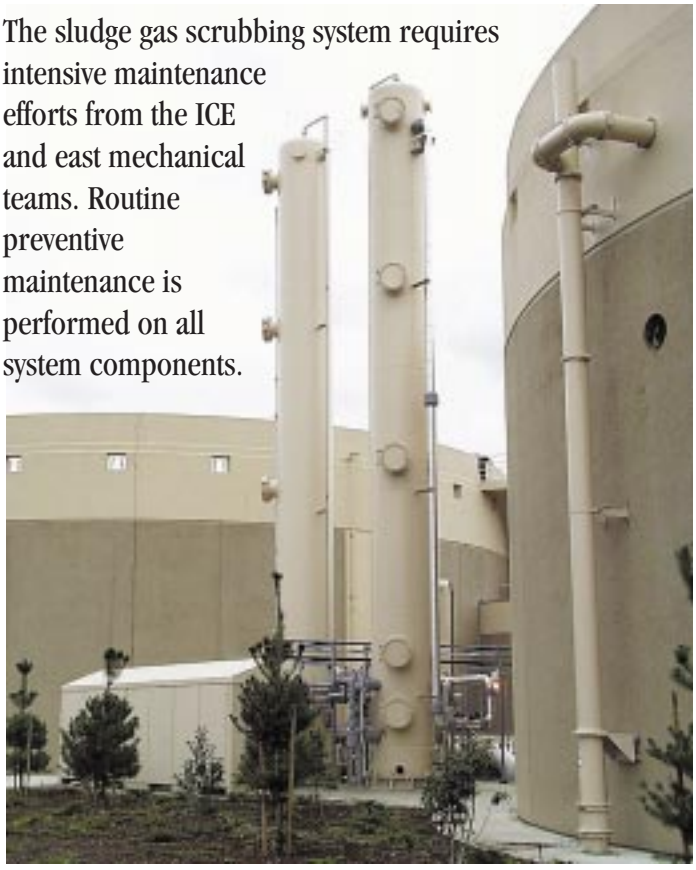
The co-generation system requires intensive maintenance efforts from the PAC and west mechanical teams. Routine preventitive maintenance is performed on all system components. Complete engine rebuilds are required every 1 to 3 years.

East Section Reclamation Plant
Sludge Gas Scrubbing System

The sludge gas scrubbing system at East Section Reclamation Plant removes low-pressure sludge gas from the digesters and blending storage tank, compresses the gas, and scrubs it with cooled C3 water to remove impurities. The scrubbed gas is then dried, metered, and sold. **The gas scrubbing system produces an annual revenue in excess of $187,000 in sales to Washington Natural Gas.**

The sludge gas scrubbing system consists of two similar, separate process trains, each capable of scrubbing 1.2 million standard cubic feet per day of sludge gas. Each process train includes digester gas collection domes, low pressure sludge gas compressors, gas scrubbing towers, scrubbing water pump/turbines, gas dryers, scrubbed gas analyzer/controller, and waste gas burners.

The sludge gas scrubbing system requires intensive maintenance efforts from the ICE and east mechanical teams. Routine preventive maintenance is performed on all system components.



WTD Maintenance – Tomorrow

As the maintenance section plans for the 21st century, they face many changes, challenges, and opportunities. The following programs have been identified by King County Regional Wastewater Services to manage the wastewater needs of our region for another 40 years or more:

- Expand the current conveyance and treatment capacity of WTD.
- Accelerate the control combined sewer (CSO) program.
- Reduce inflow and infilitration.
- Continue current biosolids program and evaluate new technologies.
- Investigate new ways to recycle and reuse effluent.

To meet the demands of this expanding, complex workplace, the maintenance section strives to stay ahead of current technology by continually researching and testing new technologies, new equipment, and new maintenance processes to streamline, improve, and economize their processes.

The maintenance section constantly searches for the most innovative and efficient solutions to preserve water quality in our region.